

Chapter 8: OFF-ROAD LARGE-SPARK IGNITION EQUIPMENT

This chapter describes the minimum criteria and requirements for Carl Moyer Program off-road large spark-ignition engine (LSI) projects. Criteria and requirements for the off-road equipment replacement category can be found in Chapter 9. Local air districts may set more stringent requirements based upon local priorities.

I. Projects Eligible for Funding

ARB has adopted in-use LSI Engine Fleet Requirements (LSI Fleet Rule). There are limited funding opportunities for equipment subject to this rule.

Table 8-1
Summary of Off-Road LSI Equipment Funding Opportunities

Equipment Type	Subject to ARB Fleet Rule?	Moyer Funding Opportunities ¹
Forklifts, sweeper/scrubbers, industrial tow tractors, airport ground support equipment (GSE)	LSI Fleet Rule ²	Small fleets: Not limited by regulation. Large/Medium fleets: Very limited opportunities
Agricultural crop preparation services (forklifts only)	LSI Fleet Rule ²	Pre-1990 MY forklifts: Not limited by regulation. 1990 and later MY forklifts: Very limited opportunities.
All other equipment (e.g. aerial lifts, construction, mining, other industrial)	No	Not limited by regulation.

¹*Limited opportunities means a fleet's compliance status with the ARB regulation must be determined.*

²Large Spark Ignition (LSI) Engine Fleet Requirements:
<http://www.arb.ca.gov/msprog/offroad/orspark/orspark.htm>

Project Types: Taking the above table into consideration, the following categories are eligible projects:

- **Equipment Replacement.** Purchases of new or used LSI equipment replacing an uncontrolled, fully functional LSI piece of equipment may be eligible. For these projects, refer to Chapter 9.
- **Retrofit Purchase**
- **New Electric Purchase.**
- **Other Project Types.** New purchases of LSI equipment certified to optional low-emission standards and repowers with cleaner engines have not been typical LSI projects, but may be funded on a case-by-case basis only with prior ARB approval.

Please see Section IV (Project Criteria) for detailed minimum eligibility requirements for all off-road LSI project categories.

II. Maximum Eligible Funding Amounts

The Carl Moyer Program pays only the incremental cost of clean air projects. The percent of LSI project costs eligible for Carl Moyer Program funding are:

- Retrofit Device – 100 percent
- New Purchase – 30 percent for new electric equipment

All projects are also subject to the cost-effectiveness threshold defined in Chapter 2 – General Criteria. Projects must also meet all other relevant criteria in Section IV of this chapter.

III. Regulatory Background

State law requires that Carl Moyer Program projects provide emission reductions early or beyond what is required by regulation, memorandum of understanding (MOU), or other legally binding document. Carl Moyer Program LSI projects must therefore be surplus to the following in order to be eligible for funding:

In-Use Regulations

- California Fleet Requirements: The 2006 regulation established levels of fleet average HC + NO_x emission requirements which become more stringent over time. This was intended to encourage accelerated turnover to cleaner LSI equipment in fleets of four or more. The compliance dates shown in Table 8-2 below with the fleet average requirements are for the impacted fleets of forklift equipment, sweepers/scrubbers, industrial tow tractors, and/or pieces of airport ground support equipment.

Table 8-2
Fleet Average Emission Level Requirement
(g/bhp-hr HC + NO_x)

Fleet Type	Compliance Dates		
	1/1/2009	1/1/2011	1/1/2013
Large Forklift Fleet (26+)	2.4	1.7	1.1
Medium Forklift Fleet (4-25)	2.6	2.0	1.4
Non-forklift Fleet	3.0	2.7	2.5

Detailed information regarding California's LSI regulatory activities can be found on the following website: www.arb.ca.gov/msprog/offroad/orspark/orspark.htm.

Emission Standards

- California Emission Standards: ARB first adopted standards of 3.0 g/bhp-hr for LSI engines in 1998 which impacted 2001 and later model year engines. ARB revisited the LSI emission standard in 2006, establishing a 2.0 g/bhp-hr HC + NO_x standard for 2007 - 2009 model year engines, and a 0.6 g/bhp-hr HC + NO_x standard for 2010 and later model year engines. At that time, ARB also adopted optional low emission standards and a retrofit verification procedure. In 2008, ARB amended the standards for LSI engines less than 1.0 liter. LSI engines with a displacement less than 825 cubic centimeters (cc) are aligned with Small Off-Road Engines (SORE) meeting a 6.0 g/bhp-hr HC + NO_x standard for 2011 and later model year engines. The amendments for LSI engines with a displacement greater than 825 cc to 1.0 liter, include a 4.8 g/bhp-hr HC + NO_x standard for 2011 – 2014 model year engines, and 0.6 g/bhp-hr HC + NO_x standard for 2015 and later model year engines.

IV. Project Criteria

These criteria provide the minimum requirements for Carl Moyer Program Large Spark Ignition projects. Participating districts retain the authority to impose additional regulations in order to address local concerns. See applicable criteria for LSI fleet requirements in (e) below.

(a) General Off-Road LSI Equipment Project Criteria

- (1) Maximum project life:
- | | |
|-----------------------------------|----------|
| (A) New electric purchase | 10 years |
| (B) Retrofit | 5 years |
| (C) Farm equipment (all projects) | 10 years |

A longer project life may receive case-by-case approval if applicants provide justifying documentation. The maximum project life does not consider regulatory requirements and may be shorter. Districts are required to offer a 10 year project life for farm equipment; however, applicants may request a project life less than 10 years.

- (2) Funding is available for propulsion engines of LSI equipment greater than 25 horsepower or electric equipment that is greater than 19 kilowatts (kW). Electric forklift equipment that is less than 19 kW may be funded if manufacturer documentation (e.g. manufacturer spec sheet) is submitted verifying electric forklift capacity is equal to or greater than 3,000 lbs. This verification documentation must be included in the project file. Funding for electric equipment other than forklifts, which are also rated less than 19kW, will be considered on a case-by-case basis. Auxiliary engines on mobile equipment and portable engines are not eligible for funding.

- (3) LSI equipment with an engine displacement of less than or equal to one liter may be eligible for funding on a case-by-case basis only with prior ARB approval.
- (4) Emission reduction technologies must be certified/verified by ARB or by the United States Environmental Protection Agency (EPA) for federally preempted engines and must comply with durability and warranty requirements. For the purposes of the Carl Moyer Program, a technology granted a conditional certification/verification by ARB is considered certified/verified.
- (5) Future annual hours of equipment operation for determining emission reductions must be based only on readings from an installed and fully operational hour-meter.
- (6) The following industries are not eligible for funding under this chapter: food retail stores, cold storage, and confined space operations (such as freezers).
- (7) Due to the regulatory requirements for rental and lease equipment subject to the LSI In-Use regulation, projects that include rented or leased equipment are not eligible.
- (8) Projects that include leased-to-own equipment are eligible provided the signed contract with the air district specifies that the applicant will keep and use the equipment for the entire project life.
- (9) The certification emission standard must be determined from the Executive Order issued for that LSI engine family, not by the engine model year. Executive Orders for off-road engines may be found at:
http://www.arb.ca.gov/msprog/offroad/cert/cert.php?eng_id=LSIE
- (10) Required Off-Road LSI Fleet Information: For forklifts, sweeper/scrubbers, Ground Support Equipment and/or Industrial Tow Tractors, an applicant's fleet size impacts project eligibility. The following basic information is needed from the applicant for all equipment subject to the regulation in order to demonstrate fleet size. All documentation submitted must be signed and dated by the applicant, and include language certifying that the fleet list provided is accurate and complete.

(A) Large/Medium/Non-Forklift Fleets

For large, medium, and non-forklift fleets subject to the Large Spark-Ignited Engine rule, applicants will need to provide the compliance records for the entire statewide fleet as described in the regulatory language (Cal. Code Regs., tit.13, § 2775.2). The required fleet information includes:

- Equipment type (e.g. forklift, GSE, etc.)
- Make of engine and equipment
- Model of engine and equipment

- Serial number of engine and equipment
- Engine emission certification standard or retrofit verification level (include Emission Control Group name)

(B) Small Fleets

Small fleets are not required to maintain compliance records, but for the purposes of determining project eligibility, districts must obtain the following information for the entire statewide fleet:

Equipment ID number (VIN, fleet assigned ID, etc.)

Equipment type (e.g. forklift, GSE, etc.)

- (11) Applicants are not required to submit information on exempted equipment (except as noted above for small fleets). Information on exempted LSI equipment can be found in Cal. Code Regs., tit. 13 § 2775(b), § 2775.1(c)(3), and § 2775.1(d-f) of the Final Regulation Order (<http://www.arb.ca.gov/regact/lore2006/oalapprovedfro.pdf>).
- (12) Case-by-case projects must receive approval from ARB prior to funding. These projects must follow the requirements as described in Chapter 3, Program Administration.

(b) Retrofits

Retrofit is the installation of a verified emission control system on an existing engine. For LSI equipment, this generally involves the addition of a stoichiometric air/fuel controller and a three-way catalyst. Information on LSI verified retrofit systems, may be found at: <http://www.arb.ca.gov/msprog/offroad/orspark/verdev.htm>

- (1) Forklifts in Classes 4, 5, and 6 are eligible for retrofit project funding. All other LSI equipment for which there are verified retrofit systems are eligible for funding.
- (2) The retrofit kit must be verified by ARB to the highest level available for the engine being retrofitted.
- (3) Eligible costs include purchase and installation of a verified retrofit kit and an hour meter if none exists on the equipment.
- (4) The maximum percent of retrofit costs eligible for Carl Moyer Program funding are: 100 percent.

(c) New Purchase

Electric Equipment

Electric equipment does not have exhaust emissions; therefore it provides greater emission reduction benefits compared to equipment with internal combustion engines. Most Carl Moyer Program funding for LSI equipment has gone towards electric forklift purchases. However, other electric equipment is eligible.

- (1) New electric forklift purchases in Class 1, lift codes 4, 5, or 6 are eligible.
- (2) For eligible projects, applicants must sign a declaration that old electric equipment is not being replaced with new electric equipment and the applicant wouldn't normally purchase electric equipment.
- (3) Eligible projects must include evidence of a plan to install either the number of battery chargers corresponding to the number of pieces of equipment purchased or fast charging units for use with multiple pieces of equipment.
- (4) Costs for battery chargers and necessary peripheral equipment associated with electric equipment projects may be included in determination of the grant award amount. These costs are considered infrastructure and can only be paid for with district match funds.
- (5) A maximum of 30 percent new purchase costs are eligible for Carl Moyer Program funding.
- (6) Purchase of new zero-emission equipment other than electric is eligible on a case-by-case basis only with prior ARB approval (i.e. fuel cell equipment).

LSI Equipment

Current LSI regulations allow manufacturers to certify engines to optional standards that are below the required emission standards. New LSI engines may certify to optional emission standards as low as 0.1 g/bhp-hr HC+NO_x. It is likely, due to market demand driven by current regulations, that the price differential between equipment certified to the standard and equipment certified to the optional standard may be rather small. As such, new LSI equipment certified to the optional standard and at least 30% below the current applicable emission standard may be eligible on a case-by-case basis only with prior ARB approval.

(d) Repower

A repower is the replacement of the in-use engine with an emission-certified engine instead of rebuilding the existing engine to its original specifications. Repowers in LSI equipment are not typical, due to relative low value of the equipment by the time an

engine repower is needed. Repowers of forklifts and other LSI equipment can be considered on a case-by-case basis only with prior ARB approval.

(e) Projects Subject to the Off-Road Large Spark-Ignition Fleet Requirement

The in-use LSI regulation requires reductions in fleet average HC+NO_x emissions. The fleet size is determined by aggregating an operator's equipment in the state of California. The regulation impacts owners of fleets of four or more LSI forklifts and/or four or more LSI sweepers/scrubbers, industrial tow tractors, and/or pieces of airport ground support equipment.

- (1) Funding is available for achieving reductions required by the regulation at least three years prior to regulatory compliance deadlines and for reductions not required by the regulation.
- (2) Large and Medium Forklift Fleets and Fleets of 4 or More Sweeper/Scrubbers, Ground Support Equipment, and/or Industrial Tow Tractors: In order to be eligible for funding, large and medium forklift fleets and fleets of four or more non-forklift LSI equipment must meet the final fleet average emission level applicable on January 1, 2013.
- (3) Agricultural Crop Preparation Forklift Fleets Model Year 1990 and Newer: These fleets are required to either retrofit, repower, or replace 100% of their fleet by January 1, 2012 or currently meet a 3.0 g/bhp-hr fleet average HC + NO_x level. Fleets that have met the 3.0 g/bhp-hr fleet average can apply for funding. Additionally, in accordance with SBX2_3, fleets that have retrofitted / repowered 20% of their fleet in compliance with the regulation are eligible for funding up to the final compliance date. In order to be eligible, these projects must be under fully executed contract, and must be installed and in operation prior to the applicable compliance date.
- (4) Fleets with equipment not subject to the off-road LSI in-use fleet regulations are eligible for funding, including:
 - (A) Agricultural crop preparation non-forklift equipment and pre-1990 forklifts
 - (B) Forklifts used exclusively in field to harvest and maintain crops
 - (C) Non-forklift LSI equipment such as aerial lifts, lawn & garden tractors, commercial turf equipment, mining and construction equipment, industrial equipment
 - (D) Small fleets (1-3 forklifts and/or 1-3 sweepers/scrubbers, industrial tow tractors or pieces of airport ground support equipment)